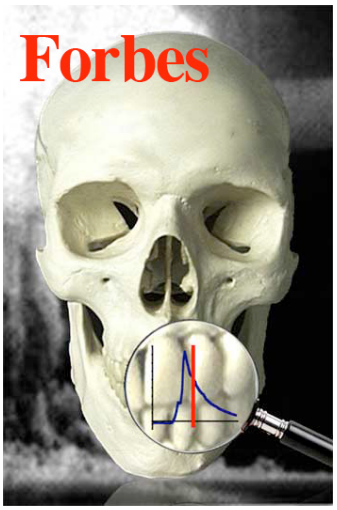
LAWRENCE LIVERMORE
REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory, May 24-June 1, 2010

Taking a bite into forensic science



By using the bomb curve data from above ground nuclear weapons testing during the Cold War (inset), Lab scientists can determine a victim's birth date by examining dental enamel.

Advances in forensic science may be something found on the television series "CSI," but a Livermore scientist is sinking his teeth into some new research in the area.

Livermore researcher Bruce Buchholz, working in conjunction with colleagues at the Karolinska Institute in Stockholm, have found a technique to date unidentified human remains more precisely than other forensic methods.

Above ground testing of nuclear bombs in the 1950s and early 1960s created elevated levels of radioactive carbon that soon became incorporated into all living things. Those elevated levels of radiocarbon were tracked carefully, and they began to drop off quickly after a test ban treaty was signed in 1963.

That carbon remains in the victim's dental enamel, the hardest substance in the body, and the analysis showed that dating the teeth with the carbon-14 method would estimate the birth date within one year.

The effect was to create a clock that investigators can now use to determine the age of victims of crimes or natural disasters.

To read more, go to http://www.forbes.com/2010/05/21/radioactive-carbon-science-technology-breakthroughs-teeth.html

A chemist's perfect vacation spot

The island of stability, where superheavy elements can remain stable for years.

It's not in the Caribbean, but it's on the edge of an island not quite found yet: the Island of Stability.

Reaching the island would be the finale of decades of synthesizing artificial elements, those heavier than uranium. By smashing smaller elements together, researchers have shoved more and more protons and neutrons into a single atomic nucleus. Jam-packed products that include more than 110 to 112 protons in each nucleus are generally called "superheavy" elements. Livermore chemists have played a crucial role in the synthesis of some of the heaviest elements including elements 113, 114, 115, 116, 117 and 118.

By studying superheavy nuclei, researchers could gain fundamental insights into the nature of matter. But all of the superheavy elements created so far are very unstable, typically decaying into other, lighter-weight elements within fractions of a second.

When the synthesis of element 117 was announced in April, scientists celebrated it as a sign of getting closer to the island's shore. But they still haven't reached dry land. "I would say we're approaching the island," says Mark Stoyer, a Lawrence Livermore nuclear physicist who was a member of the team that made element 117. "We still have a lot more exploring to do."

To read more, go to
http://www.sciencenews.org/view/feature/id/59413/title/Elemental_Escape.

Scanning for rad nukes

A VeriTainer Corp. employee is shown at a port where the crane is in operation.

A team of Laboratory scientists is helping enhance both the gamma and neutron detection sensitivity of California-based VeriTainer Corporation's patented cargo scanning system. The technology system has been operated for the past four years in field tests at three ports and in five different terminals.

VeriTainer's crane-mounted radiation detection system passively scans containers and then uses computer algorithms to detect and identify gamma and neutron sources in shipping containers as they are loaded or discharged from a container ship.

The technology occupies a unique security niche in that it can be used to scan cargo that is passed between ships – a process known as transshipment.

To read more, go to http://www.theengineer.co.uk/news/engineers-enhance-cargo-scanning-system/1002354.article

Arms open wide for open campus

Rep. John Garamendi speaks about open campus during a recent press conference.

The Livermore Valley Open Campus is moving ahead. The venture to help Lawrence Livermore and Sandia collaborate with the outside world on scientific research has commissioned San

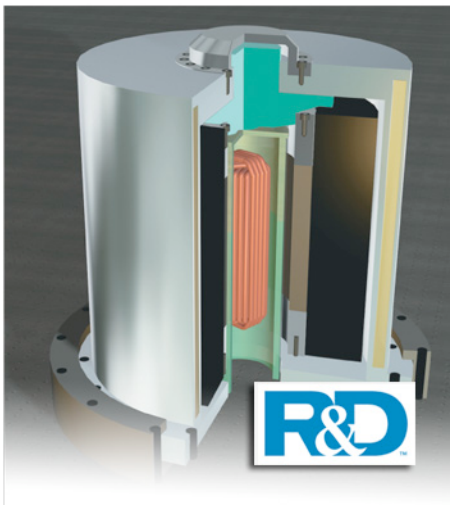
Francisco's Flad Architects to study what the master plan of its 110-acre open campus research park should include.

It secured $500,000 from the U.S. National Nuclear Security Administration to fund the study. Flad also will develop cost estimates.

Open access to the LVOC by the international science community would directly support the advancement of Sandia's Hub for Innovation in the Transportation Energy Community (HITEC), promote key LLNL programs such as the National Ignition Facility (NIF) and its high-energy density research, expand the high-tech "footprint" of the Bay Area and establish the Livermore Valley as the high-tech anchor of the East Bay.

To read more, go to
http://sanfrancisco.bizjournals.com/sanfrancisco/stories/2010/05/24/story4.html

Magnetic partnership



A diagram of a Livemore-developed flywheel.

Arnold Magnetic Technologies and the Laboratory have signed an agreement to start working together on a passive magnetic bearing system initially intended for bulk storage flywheel energy storage systems, but one that also may be transferable to other applications.

This collaboration combines research and analysis performed by LLNL's Richard Post, who has many years of experience in magnetic theory and a large portfolio of resultant inventions, along with Arnold's experience and expertise in design and manufacturing of high performance magnets and precision magnetic assemblies.

Passive magnetic bearings are currently used today, in limited quantity, in uninterruptible power supplies, such as flywheel energy storage systems, as well as couplers, motors, compressors, generators, magnetic levitation transportation and even medical devices.

To read more, go to http://www.rdmag.com/News/2010/05/Policy-And-Industry-Technology-LLNL-And-Arnold-Magnetic-Technologies-Collaborate/

Photo of the week

It's the right time for play time: Almond Avenue Day Care Center, run by the Lawrence Livermore Employee Services Association, makes it easy for scientists like Liesl Little to drop in at lunch time to visit with her 9-month-old daughter Ella. The center is located just a few minutes from the LLNL site.

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

To send input to the Livermore Lab Report, send e-mail mailto:labreport@llnl.gov.

The *Livermore Lab Report* archive is available at:
https://publicaffairs.llnl.gov/news/lab_report/2010index.html